Vanderlande Industries Dia-Bot (Diagnostic Robot) Platform Operation Omega Bid

Introduction:

Operation Omega is an impressive, interdisciplinary group comprised of four Mechanical Engineers and two Computer Engineers. Our team members have passionately strived to make the most of their Georgia Tech education. To that end, we will graduate with a combined two minors in Physics, one minor in Business and Technology (the Denning Technology and Management Program), and one minor in Industrial Design. If chosen as the team to develop a solution for Vanderlande Industry Inc, Operation Omega will devote the totality of our experience from Internships, Co-Ops, Projects, and Coursework to produce an exceptional Platform Diagnostic Robot (Dia-Bot).

Why We Are Excited About the Project:

The Dia-Bot Platform interests Operation Omega due to its high complexity, need for multiple mechanical and computer engineers, and the opportunity to work with an innovative, global company. As the robot will need to fit into small areas, collect plentiful data, and navigate across many surfaces, we would like more information about the most common desired application, smallest passageways, and environment specifications (such as elevated temperatures and no/low network connection) for the robot. Additionally, we would like to know when problems occur in their systems, currently how Vanderlande finds and addresses each issue and which issues are more common, more difficult to fix, and more difficult to diagnose. The Dia-Bot Platform is a dynamic, high caliber project that sparked our team members' problem-solving mindset, and we would love to examine and analyze design considerations and specifications of the Dia-Bot Platform with Vanderlande Industries.

Professional Work Experience:

Altogether, our team members have a combined seventy-six months of industry work experience and eleven months of research experience. Additionally, Douglas Walker spent over three years volunteering at the Summit Chase Animal Hospital as an Animal Care Technician and Grace Kasper assisted her peers for two years as an Undergraduate Teaching Assistant. Throughout our work experience, we have completed projects as Firmware Engineers, System & Solutions Engineers, Valve & Specialty Engineers, and R&D Engineers for Quality Performance. Additionally, we would like to highlight Jason Piotter's experience at Porex Company, where he helped design a semi-automated system to remove a sintered plastic part that cut process time by fifty percent. From Microsoft and Apple to IBM and Coca-Cola, our thirteen unique internships and co-ops have given Operation Omega a robust and eclectic skillset.

Projects:

Resulting from coursework and internships, our team members have created over a dozen notable projects, which can be viewed on our LinkedIn profiles below. One Creative Decisions & Design project by Douglas Walker was an autonomous system able to complete 5 tasks in under 40 seconds. His design placed sixth in the final Mechanical Engineering competition. Further, Douglas' project was programmed in mechatronic, using tools such as Gantt charts, and 3D CAD to generate feature-based, parametric solid models, assembly models, instructions, renderings, and animations. Additionally, Catherine Kasper and Connor Truono worked on similar projects programming a sensor-laden robot to follow a wall around a corner into distinct end zones as many times as possible in two minutes. Both of their teams placed in the top fifteen percent of finishers. These projects demonstrate our passion for engineering and illustrate our established success in need-finding, ideation, product design, prototyping, and project management. Working on these projects has allowed Operation Omega to gain skills beyond those taught in our majors and minors such as practical electronics engineering, prior art research for patents, and mechatronic fabrication.

Leadership:

Outside of the classroom, each of us serve as leaders in the larger Georgia Tech community. Doing so has allowed us to develop the soft skills necessary for an effective and well-rounded team. Collectively, our team members have served in Student Government, on Greek Councils, and as Varsity Athletes. We have personally hosted seminars for hundreds of students, organized campus wide philanthropy events, and worked with faculty to update Title IX policy in accordance with new regulations from the Department of Education.

Relevant Skills: For a comprehensive list of team skills, please consult our LinkedIn Profiles

Category	Skill	Team Proficiency (Out of 10)
Programming	C, C#, C++, Python, Java	10
	Mechatronics	10
	Verilog & VHDL	8
	MATLAB	7
	Git	7
	HTML/CSS/JavaScript	6
Fabrication	3D Printing	9
	Power/Hand Tools	9
	Laser cutting & Woodwork	8
	PCB Design & Fabrication	7
Software	Auto Fusion (1 Autodesk Inventor Certified User)	10
	SolidWorks	9
	AutoCAD	8
	NI LabView	7
Electronics	Embedded Systems Design	10
	Arduino, MBED, Raspberry Pi	9
	Oscilloscope, Logic Analyzer, Multi-Meter	6
	Soldering	6
Media Production	Final Cut Pro	10
	Adobe Suite	6
Communication	Technical Writing & Documentation	9
	Presentations & Public Speaking	9
	Microsoft Office Suite	9

To see more about our team members & see our skills in action please view our LinkedIn profiles:
- Andrew Galant (5th year ME)
- Catherine "Grace" Kasper (5th year CMPE)
- Connor Truono (5th year CMPE)
- Douglas Walker (5th year ME)
- Hunter Present (5th year ME)
- Jason Piotter (5th year ME)

Other Bids:
One other bid right now from Go Go Gadget

Their bid is small with 2 sentences about their relevant experience, and they have no experience with Mechatronics which already puts us ahead of them.

Bid Basics:
The intent is to develop a mechanism that can:

- Reduce labor when validating input/output devices throughout the system
- Identify potential material handling issues before the system is commissioned
- Validate the accuracy of simulation/emulation models
- Give visibility to areas of the system that are difficult or dangerous to obtain through other means
- Validate speeds and throughputs

The purpose of this project is to design and validate the Dia-Bot, a fully sensor-rich robot which traverses a material handling system to facilitate the identification of issues and confirms functionality at an accelerated pace over the current manually intensive method.

The following should be considered in the design:

- Bot should be conveyable on traditional conveyor surfaces (Belts, rollers, curves, diverts)
- It should also be able to traverse typical transitions (inclines, declines, merges, diverges)
- In addition to being conveyed on running unpowered on the conveyor, this bot must also traverse the above-mentioned machines under its own power
- On board camera remotely controlled to provide 360° rotation and vertical tilting
- Ability to track the bot within the system to an accuracy of
- Robust enough to withstand the vibration induced while navigating the system
- Measure accelerative forces seen by a product through normal handling
- Confirm dimensions of entities installed equipment
- Measure sound levels to help identify problems (misalignments, failing components, etc.)

Mechatronics background would be very useful